A Simple and Scalable Approach to Remarkably Boost the Overall Water Splitting Activity of Stainless Steel Electrocatalysts

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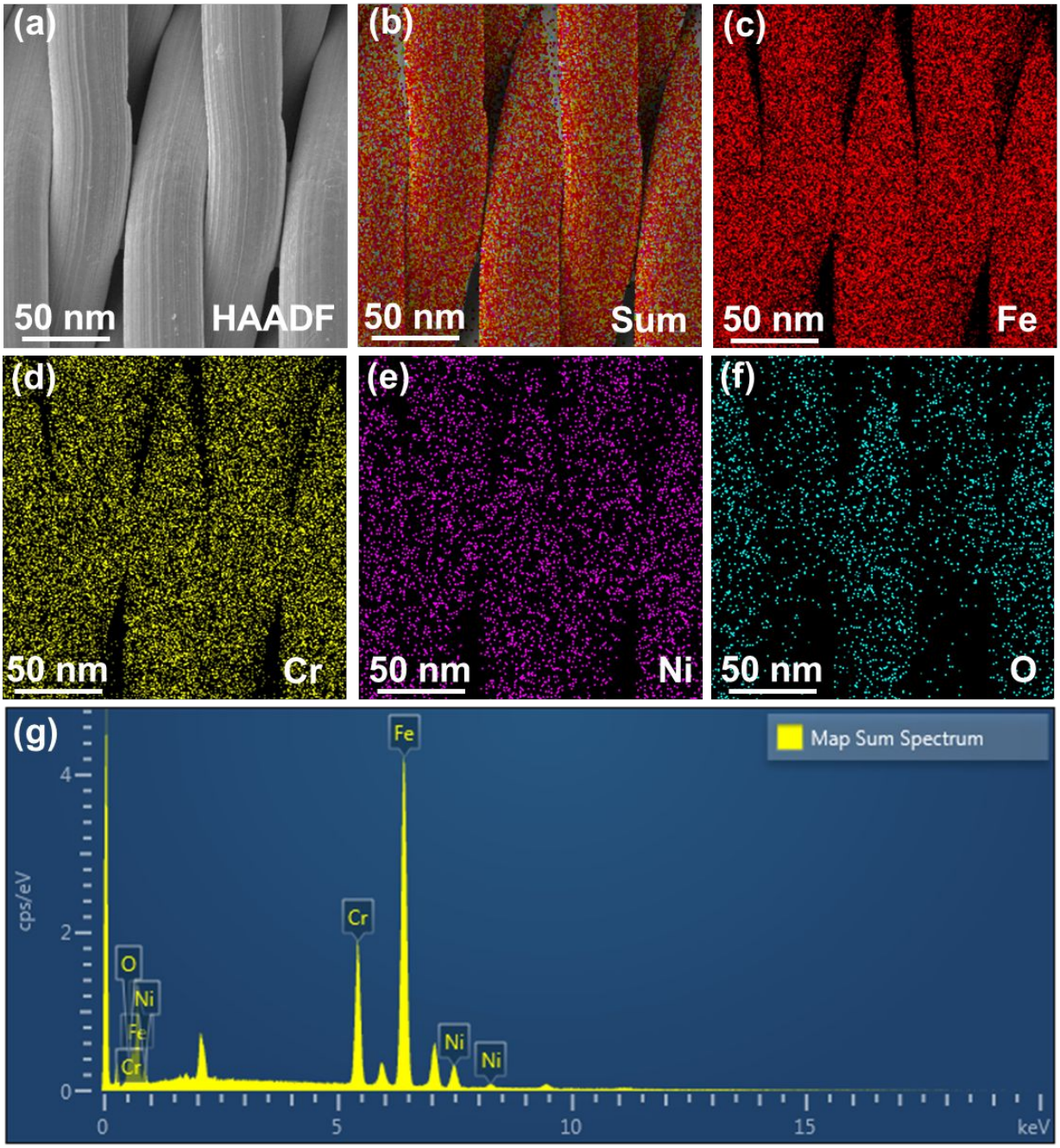

Figure S1. (a-f) EDS elemental mapping and (g) Map sum spectrum of SSM sample.

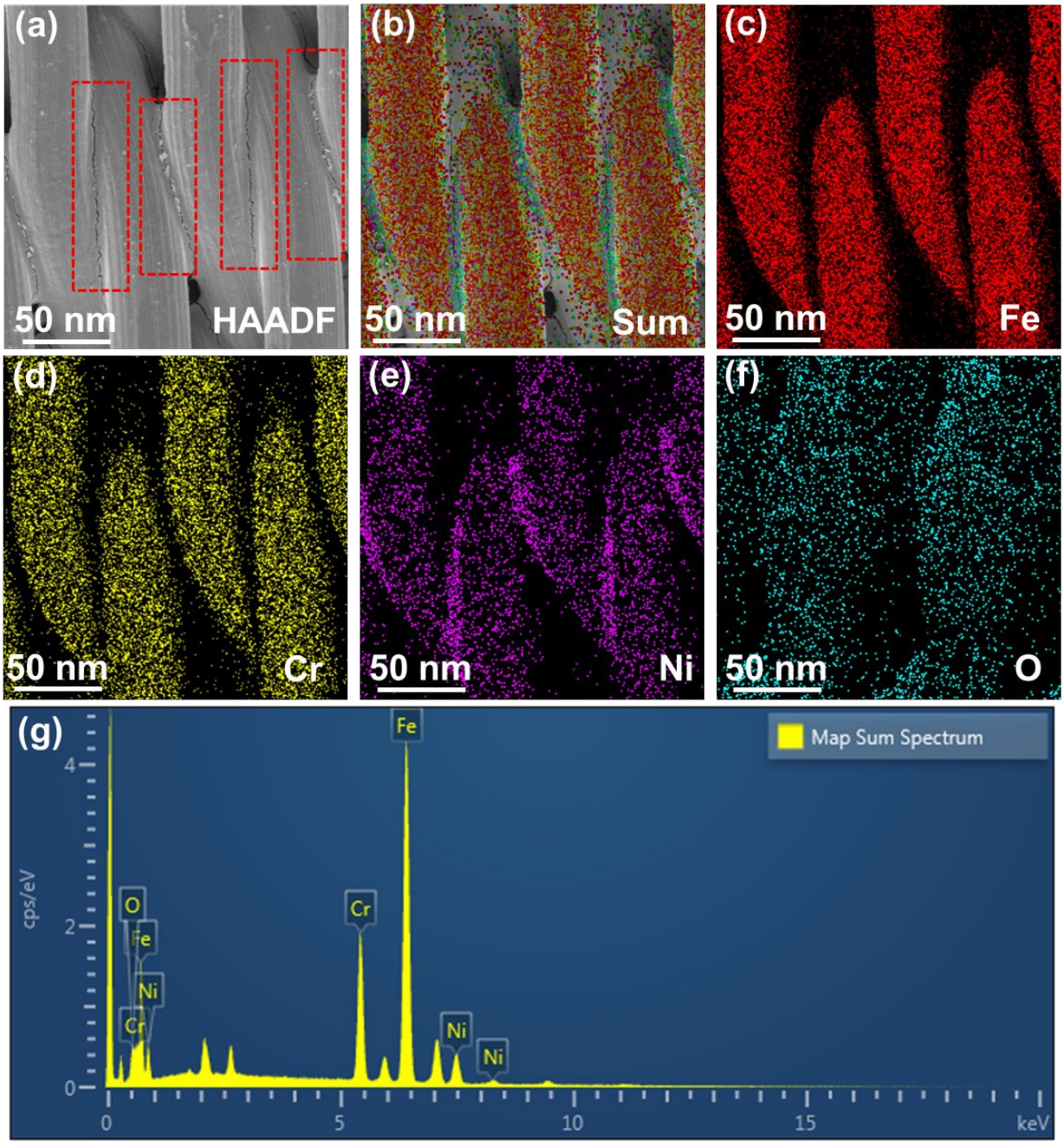

Figure S2. (a-f) EDS elemental mapping and (g) Map sum spectrum of SSM-Ni sample.

Table S1. Comparisons of the atomic composition of the electrocatalysts.

Catalysts	Fe (%)	Cr (%)	Ni (%)	P (%)	O (%)	Total (%)
SSM	70.41	19.68	7.45	-	2.45	100
SSM-Ni	66.06	18.86	8.71	-	6.38	100
SSM-Ni-P	58.71	17.26	8.16	5.37	10.50	100

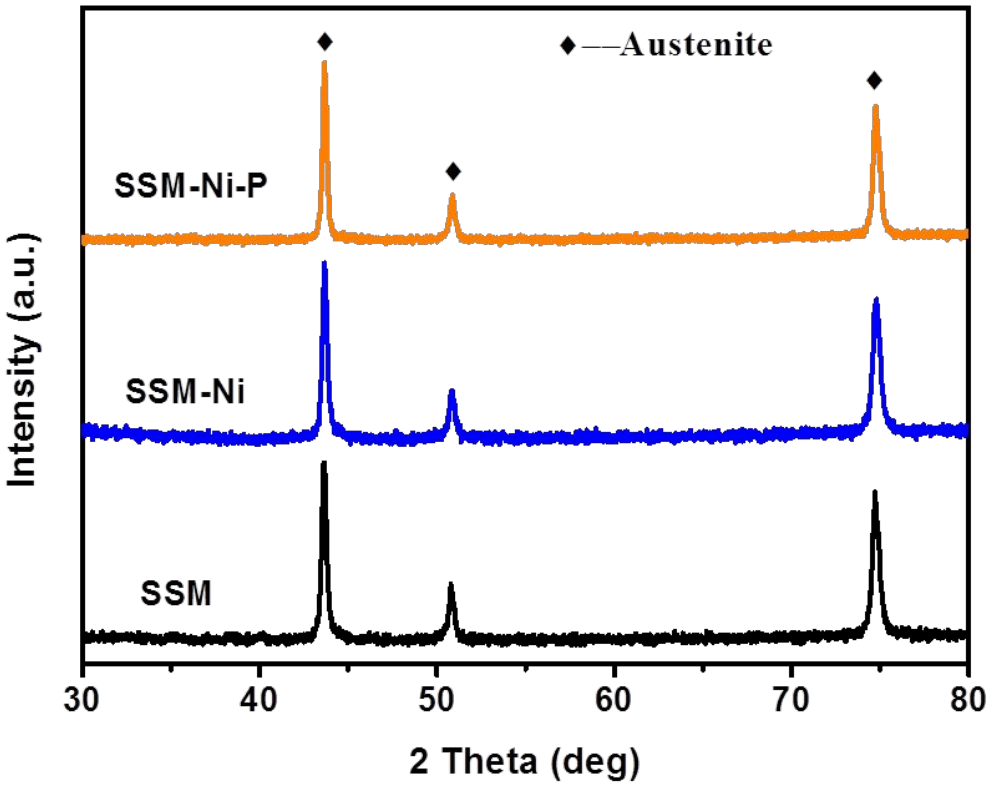

Figure S3. XRD spectra of SSM, SSM-Ni and SSM-Ni-P samples.

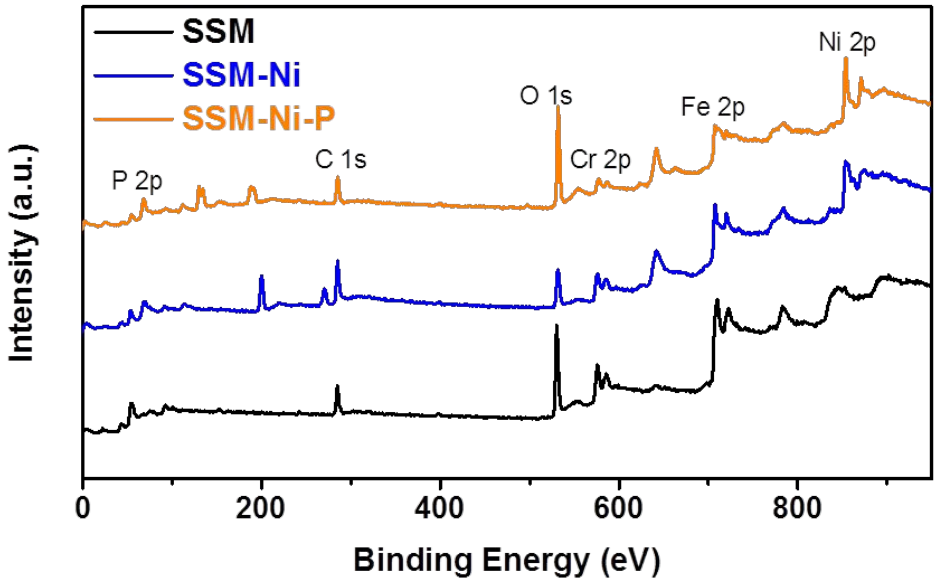

Figure S4. XPS survey spectra of SSM, SSM-Ni and SSM-Ni-P samples.

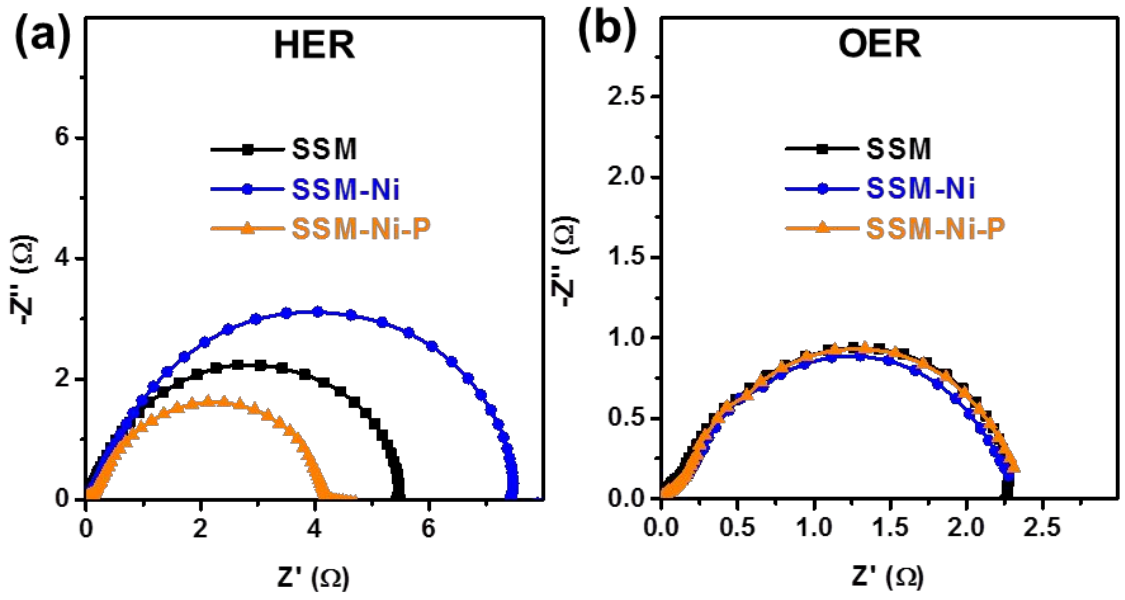

Figure S5. (a) HER and (b) OER Nyquist plots of SSM, SSM-Ni and SSM-Ni-P catalysts.

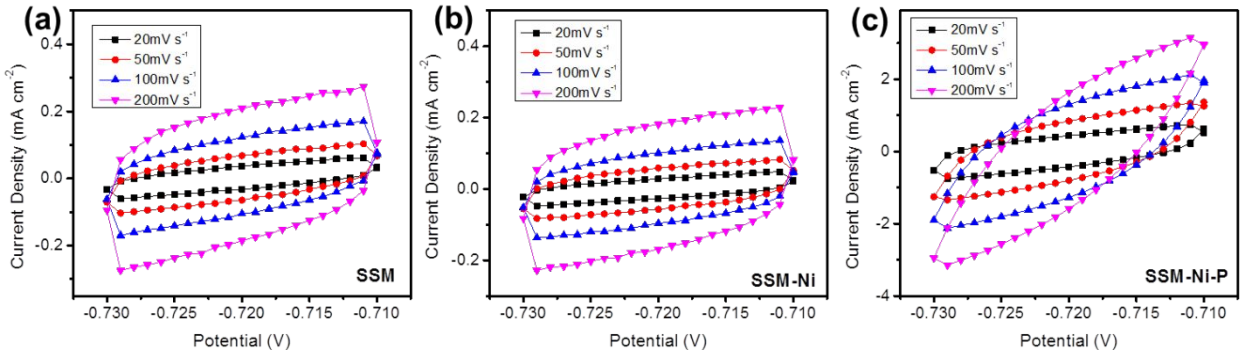

Figure S6. HER Cyclic voltammetry curves at different potential scanning rates of (a) SSM, (b) SSM-Ni and (c) SSM-Ni-P catalysts with Ag/AgCl reference electrode.

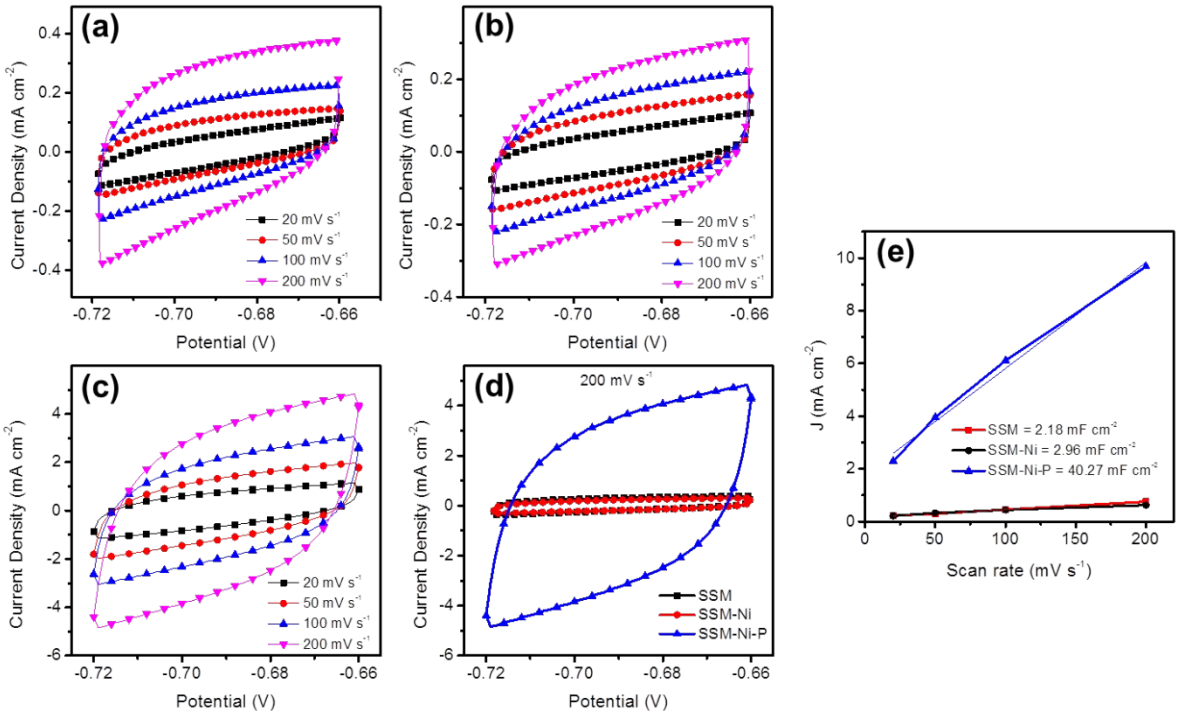

Figure S7. HER Cyclic voltammetry curves at different potential scanning rates of (a) SSM, (b) SSM-Ni and (c) SSM-Ni-P catalysts with Hg/HgO reference electrode. (d) Plots of the capacitive currents as a function of scan rate for the three electrocatalysts.

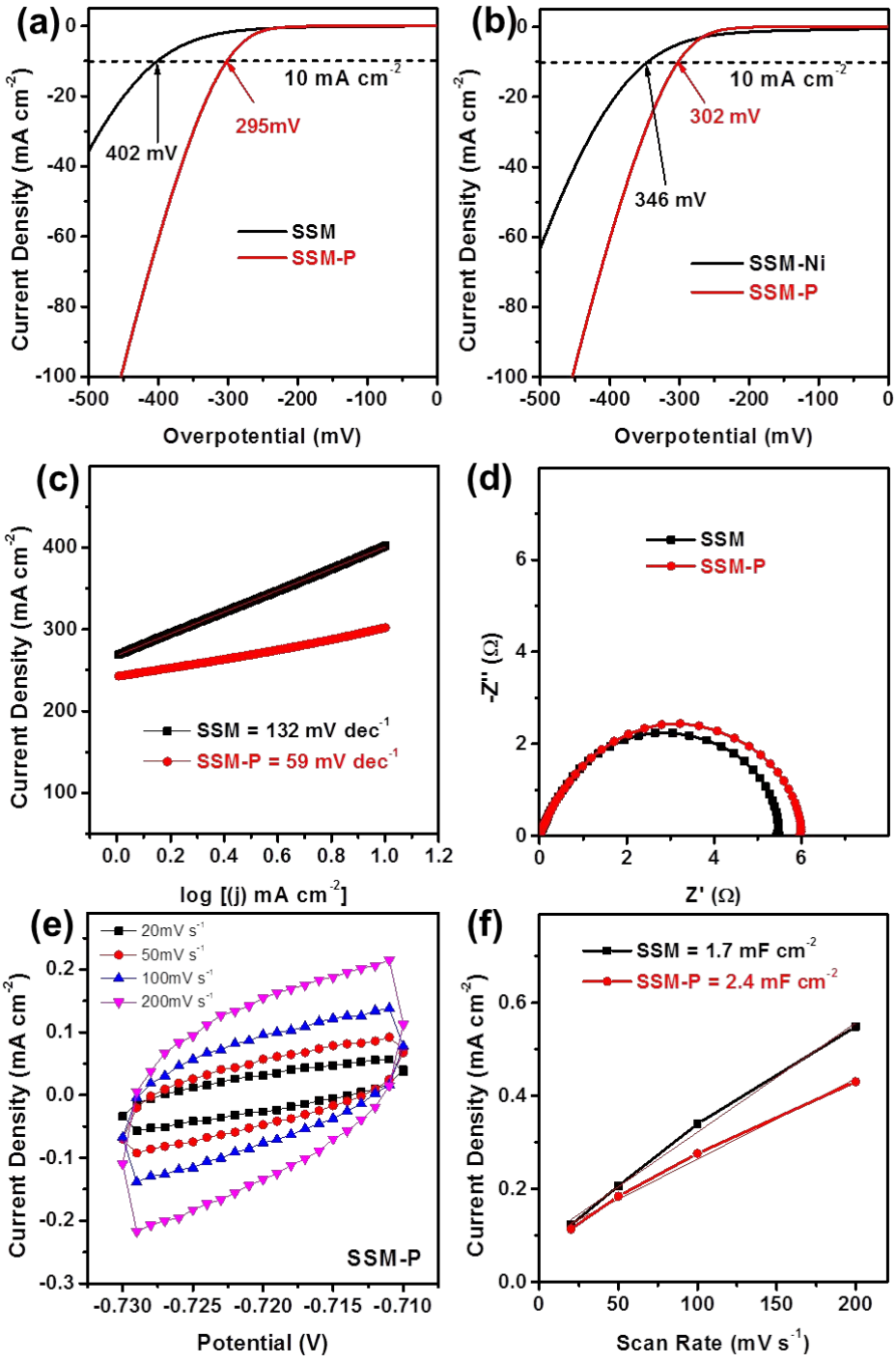

Figure S8. (a) HER LSV curves of SSM and SSM-P. (b) HER LSV curves of SSM-Ni and SSM-P. (c) HER Tafel plots and (d) HER Nyquist plots of both SSM and SSM-P

catalysts. (e) Cyclic voltammetry curves at different potential scanning rates of SSM-P catalyst. (f) Plots of the capacitive currents as a function of scan rate of both SSM and SSM-P catalysts

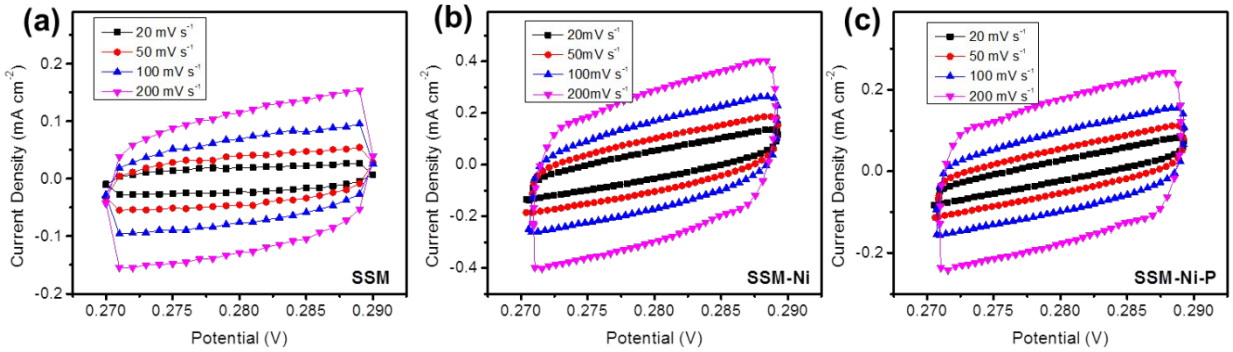

Figure S9. OER Cyclic voltammetry curves at different potential scanning rates of (a) SSM, (b) SSM-Ni and (c) SSM-Ni-P catalysts.

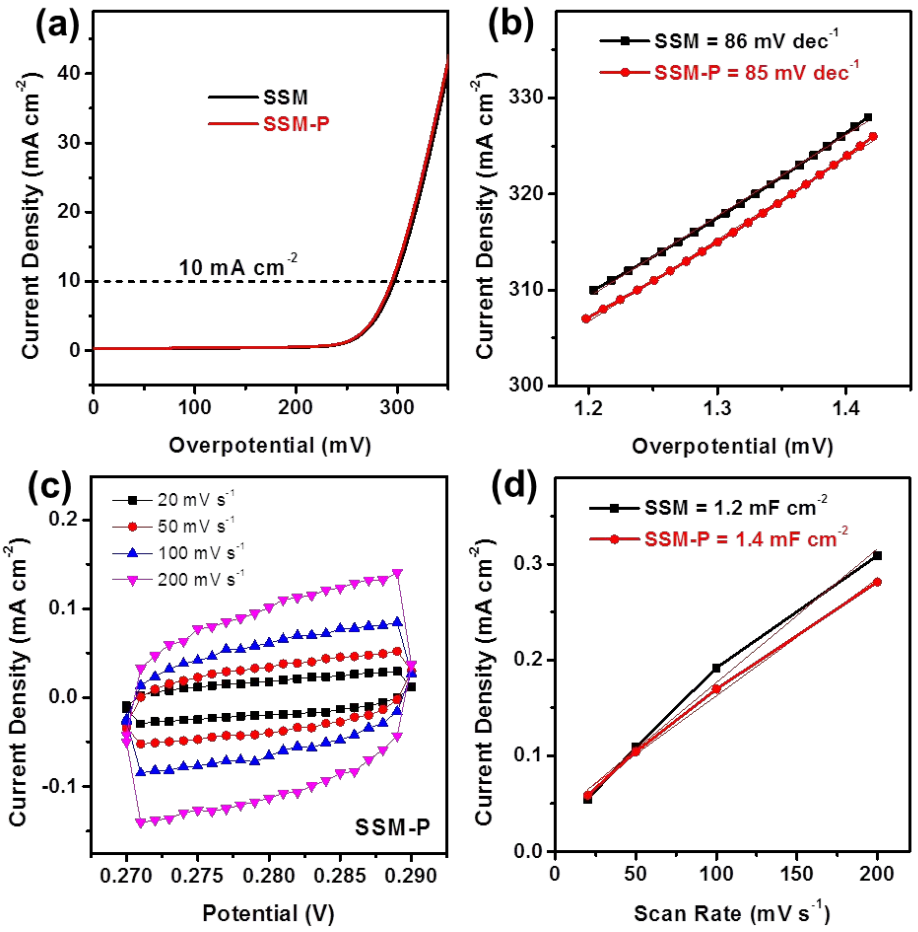

Figure S10. (a) OER LSV curves and (b) OER Tafel plots of both SSM and SSM-P catalysts. (c) OER Cyclic voltammetry curves at different potential scanning rates of SSM-P catalyst. (d) Plots of the capacitive currents as a function of scan rate of both SSM and SSM-P catalysts.

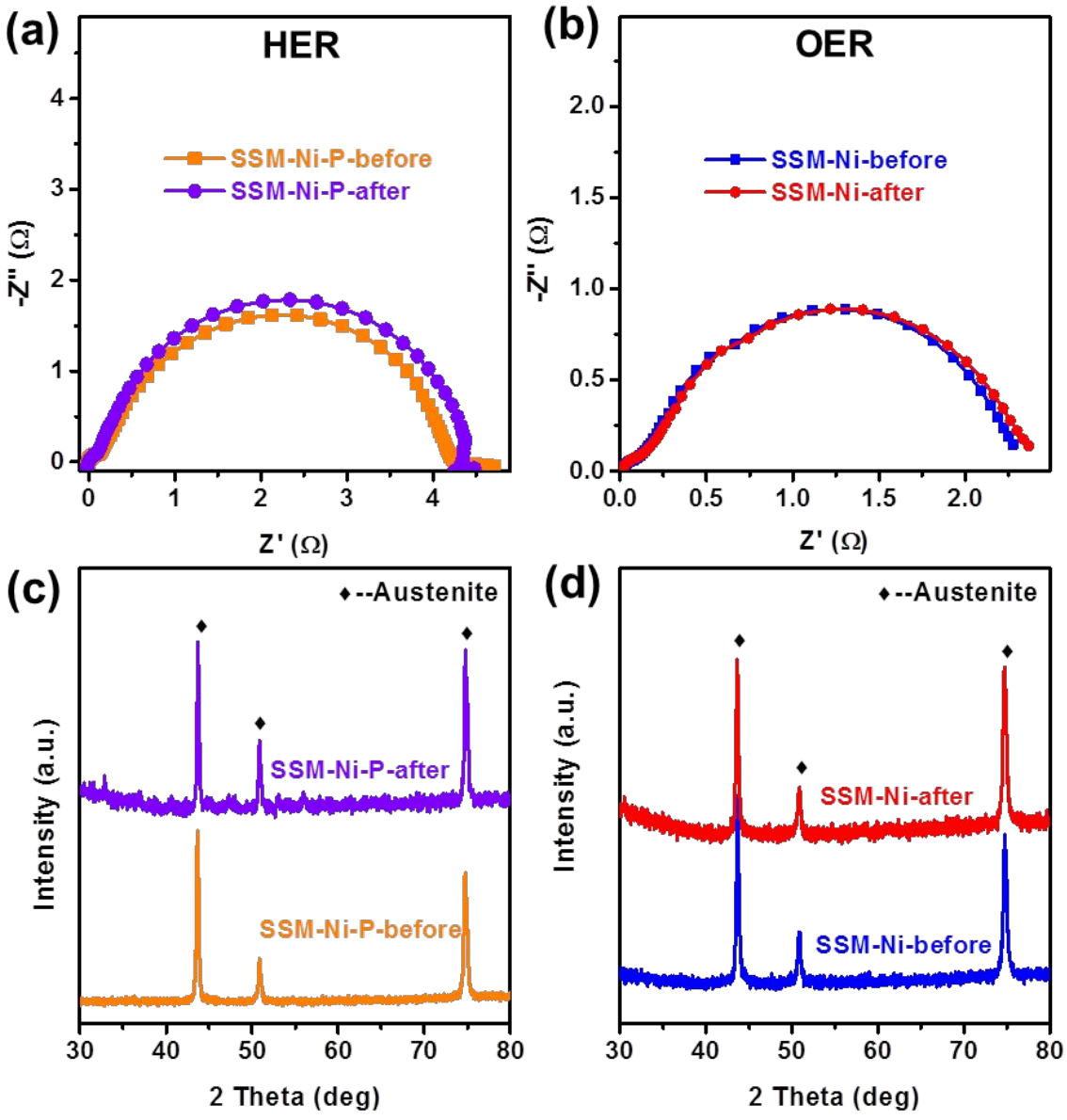

Figure S11. (a) HER Nyquist plots of SSM-Ni-P catalyst before and after stability test. (b) OER Nyquist plots of SSM-Ni catalyst before and after stability test. (c) XRD spectra of SSM-Ni-P catalyst before and after HER stability test. (d) XRD spectra of SSM-Ni catalyst before and after OER stability test.

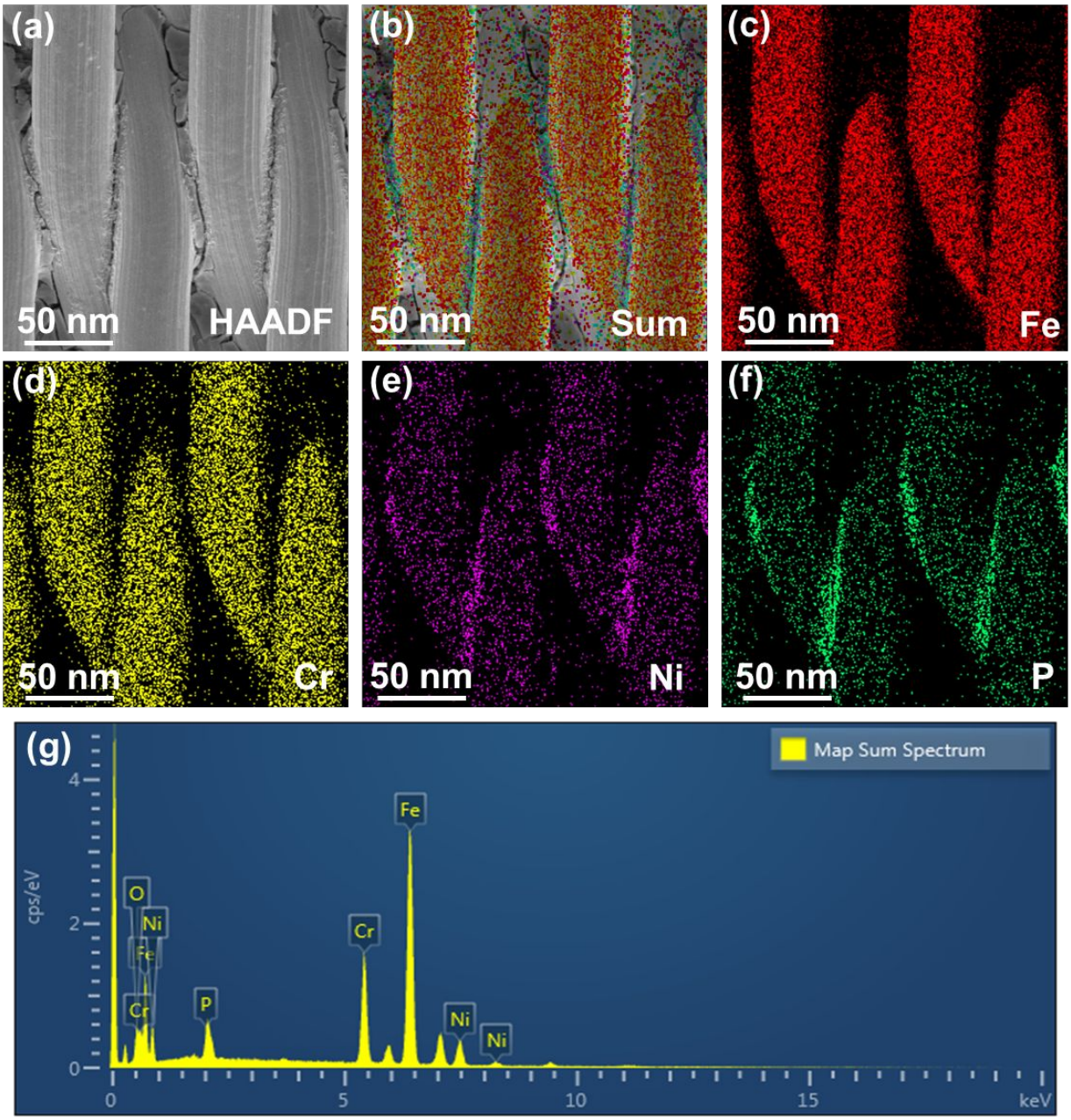

Figure S12. (a-f) EDS elemental mapping and (g) Map sum spectrum of SSM-Ni-P sample after HER stability test.

Table S2. Comparisons of the composition of SSM-Ni-P before and after HER stability test.

Elements	SSM-Ni-P-before	SSM-Ni-P-after
Fe (%)	58.71	52.38
Cr (%)	17.26	15.44
Ni (%)	8.16	9.38
P (%)	5.37	3.21
O (%)	10.50	19.59
Total (%)	100	100

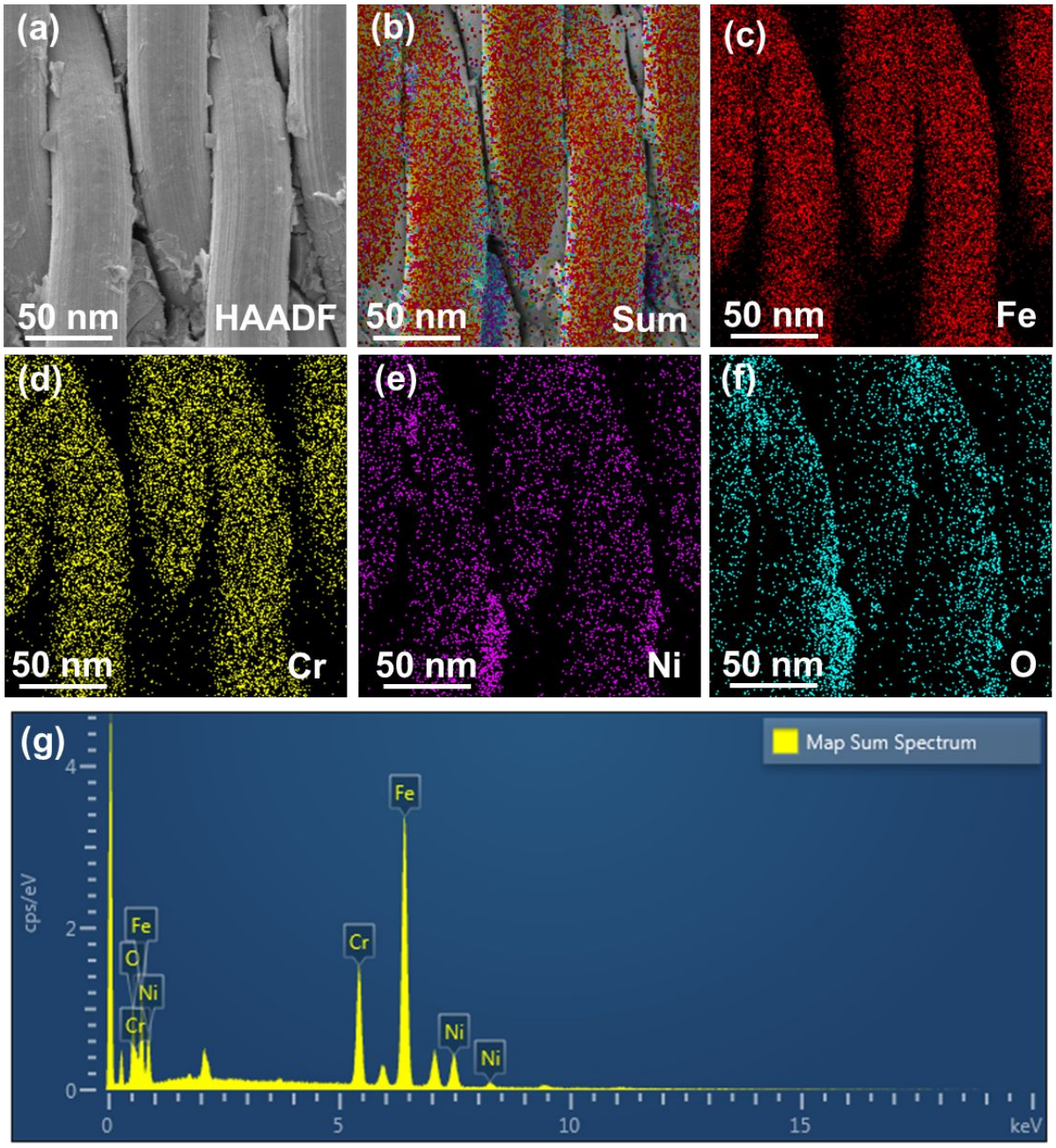

Figure S13. (a-f) EDS elemental mapping and (g) Map sum spectrum of SSM-Ni sample after OER stability test.

Table S3. Comparisons of the composition of SSM-Ni before and after OER stability test.

Catalysts	SSM-Ni-before	SSM-Ni-after
Fe (%)	66.06	54.19
Cr (%)	18.86	15.89
Ni (%)	8.71	9.91
O (%)	6.38	20.01
Total (%)	100	100

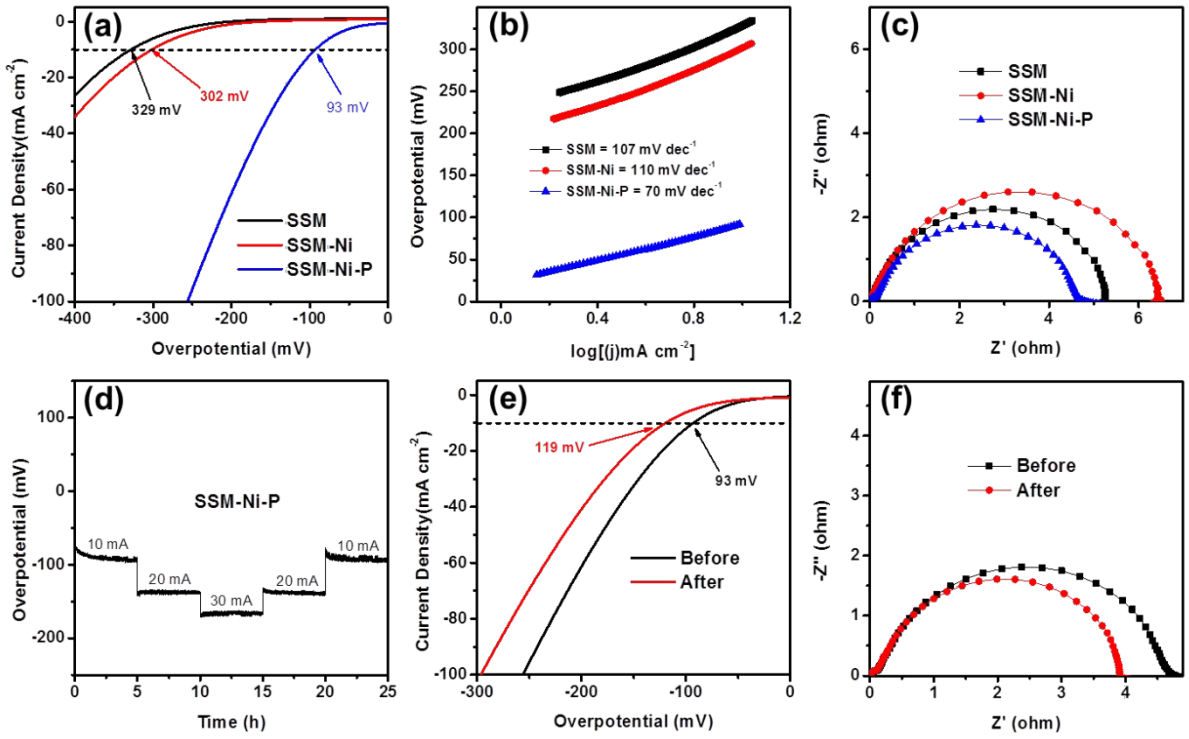

Figure S14. HER Electrocatalytic Properties using Hg/HgO reference electrode. (a) LSV curves, (b) Tafel plots and (c) Nyquist plots of SSM, SSM-Ni and SSM-Ni-P electrocatalysts. (d) 25 h stability test of SSM-Ni-P electrocatalyst. (e) LSV curves and (f) Nyquist plots of SSM-Ni before and after stability test.

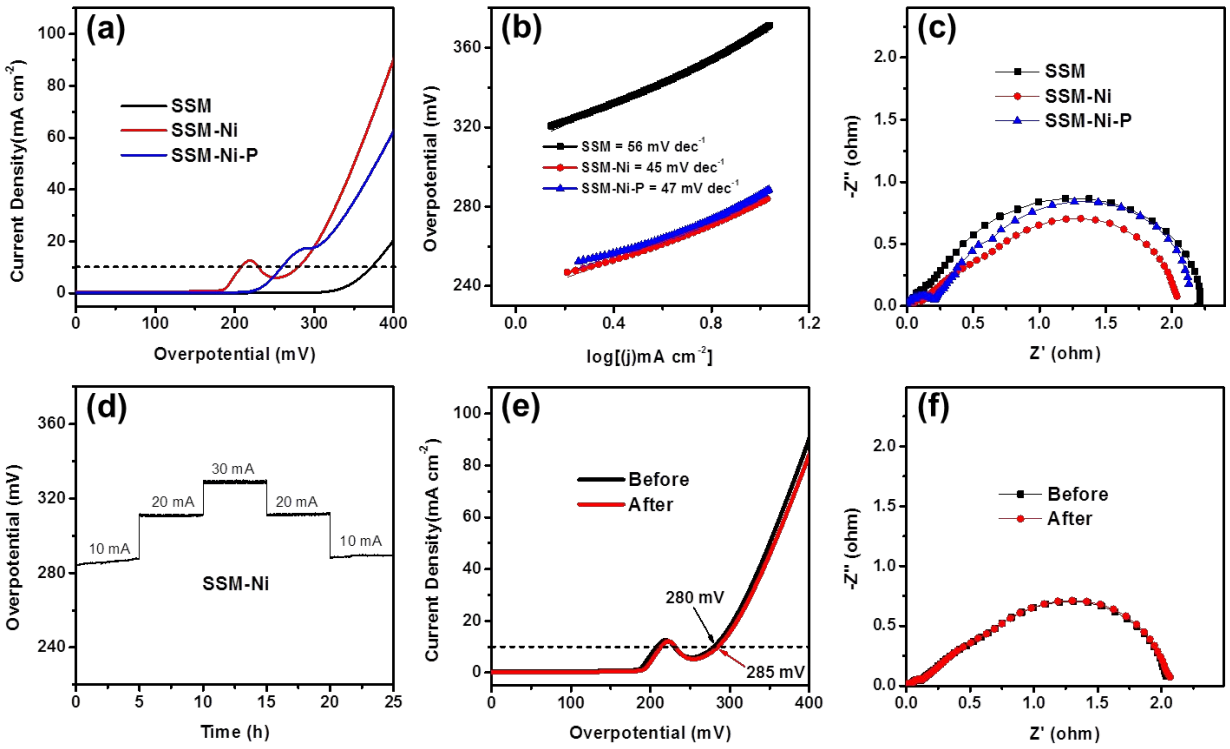

Figure S15. OER Electrocatalytic Properties using Hg/HgO reference electrode. (a) LSV curves, (b) Tafel plots and (c) Nyquist plots of SSM, SSM-Ni and SSM-Ni-P electrocatalysts. (d) 25 h stability test of SSM-Ni-P electrocatalyst. (e) LSV curves and (f) Nyquist plots of SSM-Ni before and after stability test.